What is claimed is:

1. A method of treating damaged or diseased tissue of a subject, comprising:

(a) isolating stem cells from peripheral blood of a donor by apheresis; and

(b) implanting a population of the isolated stem cells into tissue in need of treatment,

whereby implantation of the stem cells ameliorates damage or disease of the tissue.

2. The method of claim 1, wherein the donor is the subject to be treated.

3. The method of claim 1, wherein the stem cells are obtained from the peripheral blood of a donor who is HLA-matched to the subject to be treated.

4. The method of claim 1, wherein the subject is a human.

5. The method of claim 1, 2 or 3, which further comprises administering an effective amount of at least one mobilization factor to the donor, prior to step (a), in an amount and for a time sufficient to increase the peripheral blood stem cells in the donor.

6. The method of claim 5, wherein the mobilization factor is selected from the group consisting of G-CSF, GM-CSF, IL-1, IL-3, SCF, Flt-3 ligand, VEGF, PDGF, EGF,FGF-1, FGF-2, IGF-1, MGDF, NGF, and HMG CoA reductase inhibitors.

7. The method of claim 1, which further comprises administering an engraftment factor concurrently with or

following the implanting step in an amount and for a time sufficient to promote the engraftment of the cells in the subject.

8. The method of claim 7, wherein the engraftment factor is selected from the group consisting of GM-CSF, G-CSF, Il-1, IL-3, SCF, VEGF, Flt-3 ligand, Akt, hemeoxygenase, nitric oxide, 5-azacytidine, collagen, laminin, and fibronectin.

9. The method of claim 1, wherein the stem cells are expanded *ex vivo* prior to step (b).

10. The method of claim 1, which further comprises the step of fractionating the cells prior to implantation.

11. The method of claim 10, wherein the cells are fractionated by fluorescence-activated cell sorting.

12. The method of claim 10, wherein the cells are fractionated by density gradient centrifugation.

13. The method of claim 1, wherein the cells are implanted at the site of disease or damage.

14. A method of treating damaged or diseased striated muscle tissue of a subject, which comprises:

(a) isolating stem cells from peripheral blood of a donor by apheresis; and

(b) implanting a population of the isolated stem cells into said striated muscle tissue in need of treatment,

whereby implantation of the stem cells ameliorates damage or disease of the striated muscle tissue.

15. The method of claim 14, wherein the donor is the subject to be treated.

16. The method of claim 14, wherein the stem cells are obtained from the peripheral blood of a donor who is HLA-matched to the subject to be treated.

17. The method of claim 14, wherein the muscle tissue is ischemic.

18. The method of claim 14, wherein the muscle tissue is necrotic.

19. The method of claim 14, wherein the subject is a human.

20. The method of claim 14, wherein the striated muscle is myocardium.

21. The method of claim 14, wherein the striated muscle is skeletal muscle.

22. The method of claim 14, 15 or 16, which further comprises administering at least one mobilization factor to the donor from whom stem cells are obtained, prior to step (a), in an amount and for a time sufficient to increase the peripheral blood stem cells in the subject.

23. The method of claim 22, wherein the mobilization factor is selected from the group consisting of G-CSF, GM-CSF, IL-1, IL-3, SCF, Flt-3 ligand, VEGF, PDGF, EGF, FGF-1, FGF-2, IGF-1, MGDF, NGF, and HMG CoA reductase inhibitors.

24. The method of claim 14, wherein an effective amount of at least one engraftment factor is administered to the subject concurrently with or following the implanting step in an amount and for a time sufficient to promote engraftment of the implanted cells in the subject.

25. The method of claim 24, wherein the engraftment factor is selected from the group consisting of GM-CSF, G-CSF, IL-1, IL-3, SCF, VEGF, Flt-3 ligand, Akt, hemeoxygenase, nitric oxide, 5-azacytidine, collagen, laminin, and fibronectin.

26. The method of claim 14, wherein the stem cells are expanded ex vivo prior to step (b).

27. The method of claim 14, which further comprises the step of fractionating the cells prior to implantation.

28. The method of claim 27, wherein the cells are fractionated by fluorescence-activated cell sorting.

29. The method of claim 27, wherein the cells are fractionated by density gradient centrifugation.

30. The method of claim 14, wherein the cells are implanted at the site of disease or damage.

31. A method of treating an ischemic organ in a subject, which comprises:

(a) isolating stem cells from peripheral blood of a donor by apheresis; and

(b) implanting the isolated stem cells into the ischemic organ,

whereby implantation of the stem cells ameliorates the damage or disease in the ischemic organ.

32. The method of claim 31, wherein the donor is the subject to be treated.

33. The method of claim 31, wherein the stem cells are obtained from the peripheral blood of a donor who is HLA-matched to the subject to be treated.

34. The method of claim 31, wherein the subject is a human.

35. The method of claim 31, wherein the damaged or diseased organ is heart.

36. The method of claim 31, wherein the organ is liver.

37. The method of claim 31, 32, or 33, which further comprises administering at least one mobilization factor to the donor from whom the stem cells are obtained, prior to step (a), in an amount and for a time sufficient to increase the peripheral blood stem cells in the subject.

38. The method of claim 37, wherein the mobilization factor is selected from the group consisting of G-CSF, GM-CSF, IL-1, IL-3, SCF, Flt-3 ligand, VEGF, PDGF, EGF, FGF-1, FGF-2, IGF-1, MGDF, NGF, and HMG CoA reductase inhibitors.

39. The method of claim 31, which further comprises administering at least one engraftment factor to the subject concurrently with or following the implanting step in an amount and for a time sufficient to promote the engraftment of the cells in the subject.

40. The method of claim 39, wherein the engraftment factor is selected from the group consisting of GM-CSF, G-CSF, IL-1, IL-3, SCF, VEGF, Flt-3 ligand, Akt, hemeoxygenase, nitric oxide, 5-azacytidine, collagen, laminin, and fibronectin.

41. The method of claim 31, wherein the stem cells are expanded *ex vivo* prior to step (b).

42. The method of claim 31, which further comprises the step of fractionating the cells prior to implantation.

43. The method of claim 42, wherein the cells are fractionated by fluorescence-activated cell sorting.

44. The method of claim 42, wherein the cells are fractionated by density gradient centrifugation.

45. The method of claim 31, wherein the cells are implanted at the site of disease or damage.